[0022] FIG. **2** is a view showing integration of an electrode substrate and switching circuit, and a serial communication circuit;

[0023] FIG. **2**A is a view illustrating electrical stimulation when conductive gel is provided between electrodes and the skin;

[0024] FIG. **3** is a view showing an electrode substrate employing a flexible substrate;

[0025] FIG. **4** is a view showing a flexible substrate equipped with cuts;

[0026] FIG. **5** is a view showing circuit elements of each region defined in FIG. **4**; A switching circuit and a communication circuit are present each one region, and data is exchanged through communication between regions;

[0027] FIGS. **6**A, **6**B, and **6**C are views showing a configuration where stimulation electrodes are arranged on a strip-shaped flexible substrate, where: FIG. **6**A is a plan view of the essential parts of an electrical stimulation presentation board, FIG. **6**B is a cross-sectional view of the same, and FIG. **6**C is a cross-sectional view showing the whole of an electrical stimulation presentation board;

[0028] FIGS. **7**A, **7**B and **7**C are views showing a configuration where an electrode substrate and a circuit substrate are integrated;

[0029] FIG. **8** is a view showing a situation where an elastic layer having anisotropically conductive properties is interposed between an electrode substrate and a gel layer;

[0030] FIG. **9** is a view showing a current mirror circuit;

[0031] FIG. **10** is a view showing edge extraction, showing extraction of an "edge" using a simple edge extraction operation, and showing extraction of a "corner" to assist in recognition;

[0032] FIG. **11** is a view showing detection of changes in time due to time differential extraction of an image, where stimulation takes place after emphasizing moving objects;

[0033] FIG. **12** is a view showing the movement of an entire image as a result of rotation of a person's head, which is targeted for deletion as an offset;

[0034] FIG. **13** is a view showing change of "see" due to a moving parallax, where the left side of the drawing is observed from the left, and the center of the drawing is observed from the right, and the image differential at the time of translational movement of the head becomes larger as the distance becomes closer to the target;

[0035] FIG. **14** is a view illustrating time differential extraction of an image, where changes in an image due to rotational movement are compensated for using image compensation using measurements of rotational movement of the head, and only changes to the image due to other causes are extracted; and

[0036] FIG. **15** is a view showing the relationship between a threshold value automatic adjustment function and an image processing function.

DETAIL DESCRIPTION OF THE INVENTION

[A] Electro-Tactile Presentation Apparatus (Electro-Tactile Display)

[A-1] Electro-Tactile Presentation Apparatus

[0037] A description is now given of one aspect of an electro-tactile presentation apparatus that forms the basis of the present invention. The electro-tactile presentation apparatus includes stimulation electrodes, a switching circuit, a control section (mainly constituted by a computer), and a current source. The stimulation electrodes are an electrode array or an electrode matrix comprised of a plurality of electrodes arranged in transverse and vertical directions (x and y directions). Each of the electrodes constituting the electrode array and the current source are electrically connected via a switching circuit. Current source electrodes in the stimulation electrodes are then selected using a control signal from the control section (stimulation pattern generator) and are supplied with current. Stimulation is then performed from the electrodes to which current is supplied. The electrodes are preferably from 0.5 millimeters to 2.0 millimeters in diameter, and are typically 1.0 millimeters. The electro-tactile presentation apparatus switches connections of each electrode and the current source and connections of each electrode and ground over time. The electrode array presents information by changing the selection of electrodes at positions for stimulation and ground electrodes. The switching of the connections of the current source and ground is carried out by a switching circuit (for example, a half-bridge circuit). Selection of the electrodes for stimulation and the ground electrode is carried out by the control section. An electrical circuit is then formed with underneath the skin by connecting electrodes of locations for stimulation to a current source and connecting other electrodes to ground and nerves are then stimulated. Further, the electrode array presents surface information by switching stimulation points (selection of electrodes at positions for stimulation) over time.

[0038] The electro-tactile presentation apparatus further has an environment information acquisition section. The environment information is typically a scene. Image information is acquired by an image sensor (for example, a camera) and inputted. A tactile presentation signal is then generated based on the inputted image information. In a preferred embodiment, the image sensor is mounted on a person's head (this includes mounted on spectacles or sunglasses worn on a person's head). Light used by the image sensor to acquire image information is by no means limited to visible light, and, for example, an infrared camera employing infrared light is also possible. The acquired environment information is processed by the control section. The control section then outputs a tactile presentation signal (control signal) for presenting certain stimulation pattern information to the switch circuit. Tactile stimulation is then generated from the electrode array by the switching circuit. In a preferred mode, the electro-tactile presentation apparatus is a forehead-mounted electro-tactile presentation apparatus that provides an FRS system. The forehead-mounted electrical stimulation presentation apparatus comprises a forehead-mounted electrical stimulation presentation board suited to the curvature of a person's forehead.

[A-2] FRS System

[0039] The FRS (Forehead Sensory Recognition System) uses technology that takes the tactile sensation occurring at a person's forehead as a substitute retina. Sensory proxies using electrical stimulation have been proposed since the 1960's but the method of taking the forehead as a stimulated portion is relatively new. Using the forehead as a stimulated portion is rational. Wearing items on the forehead is easy and conversion of the coordinate system within the brain is straightforward compared to the case of wearing on other parts of the body. A compact camera fitted to, for example, sunglasses, captures the frontal view of the wearer. In the FRS system, an image for a view taken by a compact camera is converted to